

## **ASM-LS**

# LSxxx Series High Power Loud Speaker





## **INSTALLATION AND OPERATION MANUAL**

**REV 1.10** May 13, 2016

Anodyne Electronics Manufacturing Corp.
15-1925 Kirschner Road
Kelowna BC, Canada
V1Y 4N7

Telephone (250) 763-1088 Facsimile (250) 763-1089

Website: www.aem-corp.com

© 2016 Anodyne Electronics Manufacturing Corp. (AEM), All Rights Reserved



#### **COPYRIGHT STATEMENT**

© 2016 Anodyne Electronics Manufacturing Corp. (AEM), All Rights Reserved

This publication is the property of AEM and is protected by Canadian copyright laws. No part of this document may be reproduced or transmitted in any form or by any means including electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of AEM.



Prepared By:

Dd

Duane Stewart Designer Sept 21/16 Checked By:



Tony Pearson Designer Sep 21, 2016



Tom Betzelt Product Support Manager Sep 22, 2016 Approved By:

Todd Blackstock R&D Manager Sep 23/16

The status of this installation and operation manual is controlled by the revision shown on the title page. The status of each section is controlled by revision shown in the footer of each page. All revisions affecting sections of this manual have been incorporated.

	AEM MANUAL REVISIONS								
Section	Revision Number	Revision Description	Date						
All	Rev 1.10	RAS#589: Updated Mechanical Installation section.	May 13, 2016						
All	Rev 1.00	Initial Release	April 24, 2015						



### **Table of Contents**

Section	Title	Page
1.0	Description	
1.1	Introduction	1-1
1.1	Product Description	1-1
1.3	Design Features	1-2
1.4	Specifications	1-2
1.4.1	Electrical Specifications	1-2
1.4.1	Physical Specifications	1-2
1.4.2	Environmental Specifications	1-2
1.4.5	System Configuration	1-3
1.5	System Configuration	1-3
2.0	Installation	
2.1	Introduction	2-1
2.2	Unpacking and Inspection	2-1
2.2.1	Warranty	2-1
2.3	Installation Procedures	2-1
2.3.1	Warnings	2-1
2.3.2	Cautions	2-2
2.3.3	Cabling and Wiring	2-2
2.3.4	Mechanical Installation	2-2
2.3.5	Post-Installation Checks	2-3
2.4	Accessories Required But Not Supplied	2-3
2.5	Continued Airworthiness	2-3
2.6	Speaker Location and Orientation	2-4
2.7	Installation Drawings	2-6
3.0	Operation	
3.1	Operation Specifics	3-1



### **Section 1.0 Description**

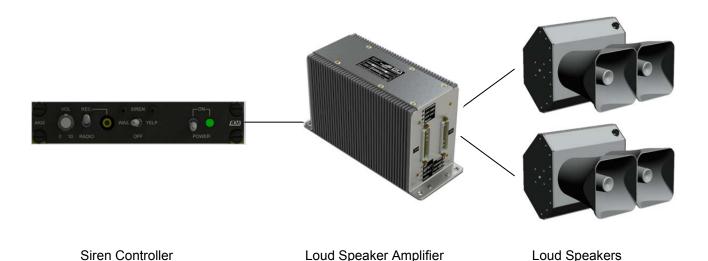
#### 1.1 Introduction

Information in this section consists of product description, design features and specifications for the LSxxx Series High Power Loud Speakers.

Review all notes, warnings and cautions.

#### 1.2 Product Description

The LSxxx Series Loud Speakers are high output power loud speakers for use in air-to-ground, air-to-sea, or ground-to-ground audible communication systems. The LSxxx Series speakers are intended for use with the LSA400 or LSA800 series amplifiers and a siren controller as a complete system.





### 1.3 Design Features

This series of speakers is available in a single, double, or triple bell configuration, which allows the user to vary the range and/or dispersal pattern depending on the mounting configurations.

The speaker drivers have been updated to provide much better conversion of electrical power (Watts) to sound pressure (SPL).

The driver assembly and newly designed mechanical parts are field replaceable for ease of maintenance.

The LSxxx Series speakers are designed and qualified to meet many operational roles of current and future light, medium, and heavy helicopters as well as fixed wing aircraft.

### 1.4 Specifications

#### 1.4.1 Electrical Specifications

Loudspeaker	Total Bell Configuration	Impedance	Rated Peak Power	Output Level @ 1m & Rated Peak Power	Weight
LS300-200	1	5.5 Ω	300 Watts Peak	130dB	15 lbs [6 kg]
LS600-200	2	2 Channels at 5.5 Ω each	600 Watts Peak	135dB	28 lbs [12.7 kg]

At the time of publication, performance information was available only for the speakers listed above. For details of other units, please contact the Product Support department at AEM.

#### 1.4.2 Physical Specifications

See Mechanical Installation drawings (LSxxx-xxx-922-0) for speaker physical specifications (where x is the model reference of the specific unit under consideration, i.e. LS300-200-922-0)

#### 1.4.3 Environmental Specifications

Temperature	-40 to +60°C (operating) -55 to +85°C (survival)
Altitude	+25,000 ft. (+7,620 m) max.
Humidity	95% Non-condensing
Shock	6g (any axis)
Vibration	DO-160G Category 'S' Curves B & M and Category 'U2' Curves F & F1
Magnetic Effect	DO-160G category 'B'



### 1.5 System Configuration

Loud Speaker	Total Bell Configuration	Amplifier	Input Power	Output Level @ 1m
LS300-200	1	LSA400	28 Vdc	130dB
LS600-200	2	LSA400	28 Vdc	135dB
LS600-200	2	LSA800	28 Vdc	135dB
1 X LS300-200 1 X LS600-200	3	LSA800	28 Vdc	137dB
2 X LS300-200	2	LSA800	28 Vdc	135dB
2 X LS600-200	4	LSA800	28 Vdc	141dB

At the time of publication, performance information was available only for the speakers listed above. For details of other units, please contact the Product Support department at AEM.

End of Section 1.0



#### Section 2.0 Installation

#### 2.1 Introduction

Information in this section consists of: unpacking and inspection procedures, installation procedures, post-installation checks, and installation drawings.

### 2.2 Unpacking and Inspection

Unpack the equipment carefully. Inspect the unit visually for damage due to shipping and report all such claims immediately to the carrier involved. Note that each unit should have the following:

- LSxxx Series High Power Loud Speaker
- Product Information Card
- Certificate of Conformity or Release Certification

Verify that all items are present before proceeding and report any shortage immediately to your supplier.

#### 2.2.1 Warranty

All Anodyne Electronics Manufacturing Corp. (AEM) products are warranted for 2 years. See the website www.aem-corp.com/warranty for complete details.

#### 2.3 Installation Procedures

#### 2.3.1 Warnings

#### **WARNING:**

When the speaker is connected to an appropriate amplifier, the system is capable of producing high sound pressure levels. Proper personal protective equipment is required to prevent hearing damage.

Stand clear, this equipment operates at an intense sound level.

Personnel must be kept away from the direct loud speaker beam.



#### 2.3.2 Cautions

#### **CAUTION:**

Do not operate the equipment in a hangar or in confined areas.

Do not operate the equipment with snow, water or other foreign matter in the loud speaker horn.

Do not clean the loud speaker with compressed air.

Bundle and route the Speaker Output wires separately from low level Audio Input lines.

Always check ADF and compass calibration after installing external speakers or power amplifiers.

#### 2.3.3 Cabling and Wiring

All wire shall be selected in accordance with the original aircraft manufacturer's Maintenance Instructions or AC43.13-1B Change 1, Paragraphs 11-76 through 11-78. Unshielded wire types shall qualify to MIL-W-22759 as specified in AC43.13-1B Change 1, Paragraphs 11-85, 11-86, and listed in Table 11-11. For shielded wire applications, use Tefzel MIL-C-27500 shielded wire with solder sleeves (for shield terminations) to make the most compact and easily terminated interconnect. Follow the interconnect drawing in Section 2.7 as required.

Allow 3" from the end of the shielded wiring to the shield termination to allow the connector hood to be easily installed. Refer to the interconnect drawing in Section 2.7 for shield termination details. Note that the hood is a "clamshell" hood, and is installed after the wiring is complete. Aircraft harnessing shall permit the unit to be removed for easy access to all adjustments.

Maintain wire segregation and route wiring in accordance with the original aircraft manufacturers Maintenance Instructions.

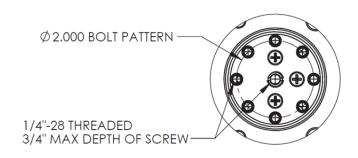
#### 2.3.4 Mechanical Installation

The installing agency is responsible for the design, engineering and installation of the mounting bracket for the LSxxx Series High Power Loud Speakers. Careful consideration should be given to the operating environment and the mechanical forces acting upon the LSxxx Series unit(s).

The guidelines used in the AC43.13-1B Advisory Circular should be used to provide general reference to the selection of hardware, torque values, etc. The specific references are contained in AC43.13-1B, Chapter 7, Table 7-1.

A minimum of five mounting 1/4"-28 bolts per side is recommended for the LS300-200 and LS600-200 speakers. The bolts should have a torque value of 50 - 70 inch lbs as per the AC43.13-1B. Refer to the following diagram for the mounting hole pattern.





MOUNTING HOLE PATTERN

The LSxxx-200 series of loud speakers, Rev 2.00 or later, can be mounted using the AFM-SB-XX series of Meeker Aviation mount brackets.

AEM Part Number	Required Meeker Aviation  Mounting Bracket
LS300-200	AFM-SB-1D
LS600-200	AFM-SB-1B

For information and availability of the AFM-SB-XX series of mounting brackets contact Meeker Aviation:

#### **Meeker Aviation**

#206 19142 122nd Ave Pitt Meadows, BC Canada V3Y 2P9 PH: 604-644-1125

FAX: 760-758-9612 www.meekeraviation.com

#### 2.3.5 Post-Installation Checks

Ensure all connectors are tight and the speaker array mechanical installation is sound.

Ensure that the speakers are secure and adjusted with the line of sight focused towards the intended target. See section 2.6 for speaker location and orientation information.

When the PA system installation is complete, carry out a full performance test to ensure that all components of the system (including the loud speaker array) are functioning correctly.

#### 2.4 Accessories Required But Not Supplied

LS300-IK LS300 and LS600 90° Sealed Screw Terminal Installation Kit

#### 2.5 Continued Airworthiness

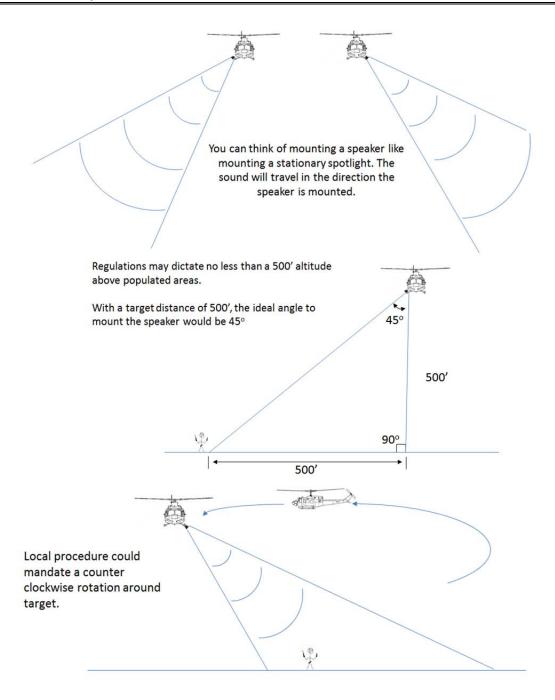
Maintenance of the LSxxx Series is 'on condition' only. Periodic maintenance of this product is not required.

May 13, 2016 Rev: 1.10

Page 2-3

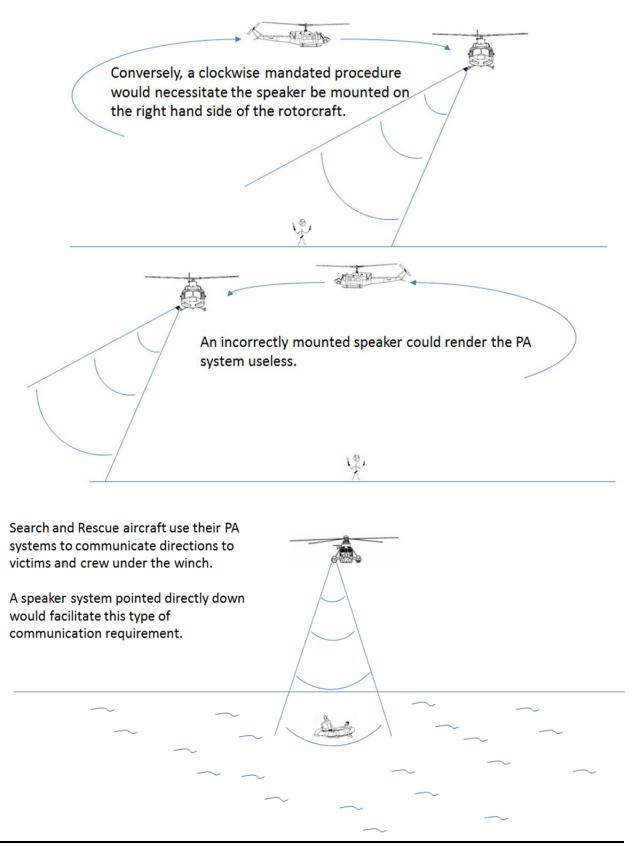


### 2.6 Speaker Location and Orientation



A speaker mounted on the left side of the helicopter would facilitate PA communications from helicopter to target.



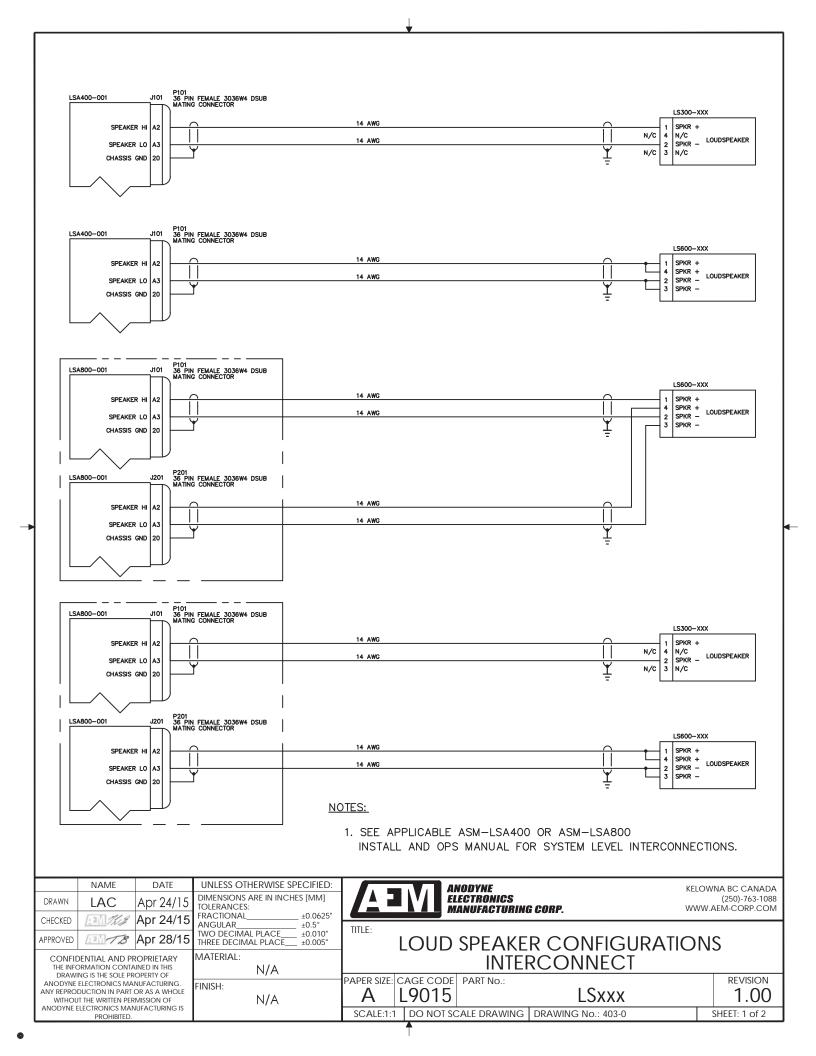


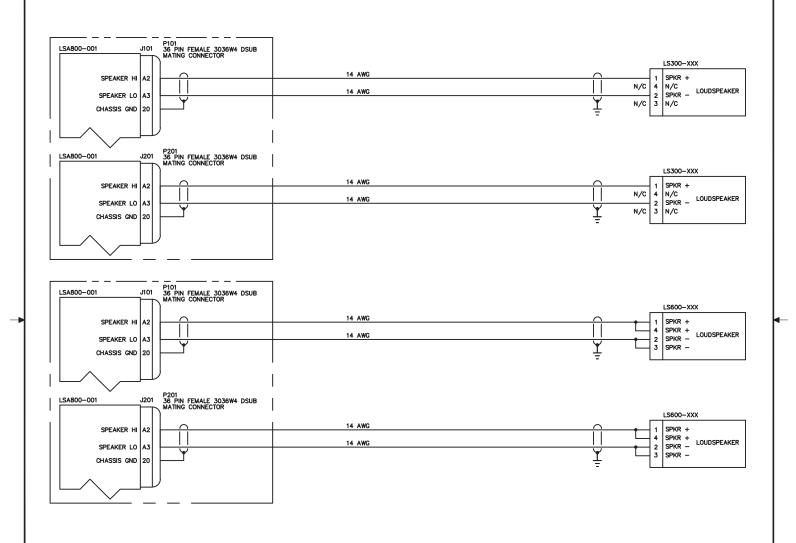


### 2.7 Installation Drawings

DRAWING	REV.	DESCRIPTION	TYPE	SERIAL NO.
LSxxx-403-0	1.00	Loud Speaker Configurations	Interconnect	All
LS300-405-0	2.00	Loud Speaker, LS300	Connector Map	1006 and up
LS300-405-0	1.00	Loud Speaker, LS300	Connector Map	Up to 1005
LS600-405-0	2.00	Loud Speaker, LS600	Connector Map	1006 and up
LS600-405-0	1.00	Loud Speaker, LS600	Connector Map	Up to 1005
LS300-200-922-0	2.00	Loud Speaker, LS300	Mechanical Installation	1006 and up
LS300-200-922-0	1.10	Loud Speaker, LS300	Mechanical Installation	Up to 1005
LS600-200-922-0	2.00	Loud Speaker, LS600	Mechanical Installation	1006 and up
LS600-200-922-0	1.00	Loud Speaker, LS600	Mechanical Installation	Up to 1005

Section 2.0 ends following the above documents





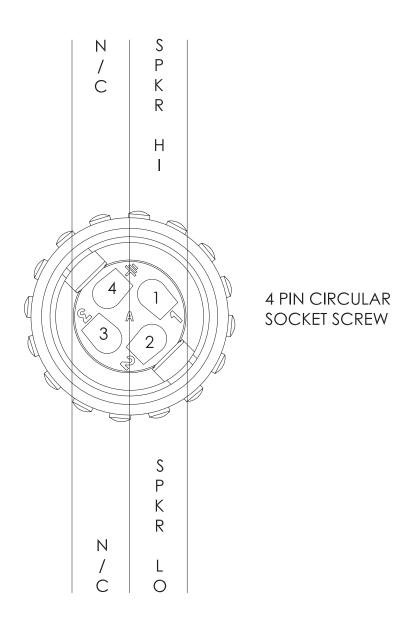
#### NOTES:

 SEE APPLICABLE ASM-LSA400 OR ASM-LSA800 INSTALL AND OPS MANUAL FOR SYSTEM LEVEL INTERCONNECTIONS.

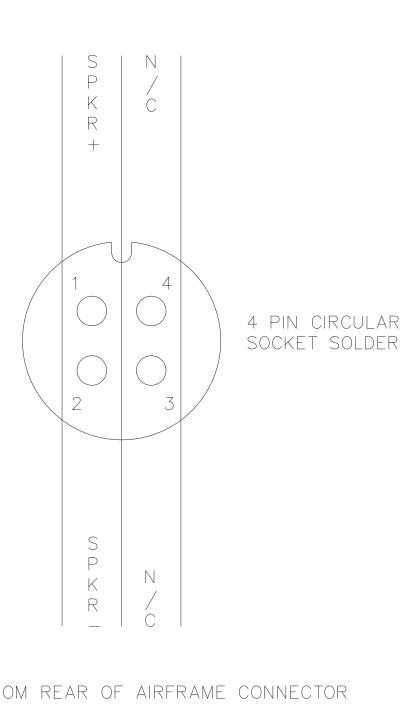
	NAME	DATE	UNLESS OTHERWISE SPECIFIED:						
	INAIVIE	DAIL		-		NODYNE		KELOWI	NA BC CANADA
DRAWN	LAC	Apr 24/15	DIMENSIONS ARE IN INCHES [MM] TOLERANCES:	<b>│</b>		ECTRONICS Anufacturine	CORP.	WWW.A	(250)-763-1088 EM-CORP.COM
CHECKED	11/1/19	Apr 24/15	FRACTIONAL ±0.0625" ANGULAR ±0.5°	TITLE:					
APPROVED	13/1/8	Apr 28/15	TWO DECIMAL PLACE ±0.010" THREE DECIMAL PLACE ±0.005"	LOUD SPEAKER CONFIGURATIONS				S	
THE INFO	DENTIAL AND PE	INED IN THIS	material: N/A		INTERCONNECT				
	ING IS THE SOLE PR ELECTRONICS MA		· · · · · · · · · · · · · · · · · · ·	PAPER SIZE:	CAGE CODE	PART No.:			REVISION
ANY REPRO	DUCTION IN PART JT THE WRITTEN PER	OR AS A WHOLE MISSION OF	FINISH: N/A	Α	L9015	LSxxx			1.00
ANODYNE E	ELECTRONICS MAN PROHIBITED.	IUFACTURING IS		SCALE:1:1	DO NOT SO	CALE DRAWING	DRAWING No.: 403-0	5	SHEET: 2 of 2

6

	REVISIONS		
REV	DESCRIPTION	DATE	BY
2.00	ECO# 1037, NEW CONNECTOR	16-Feb-15	DMF

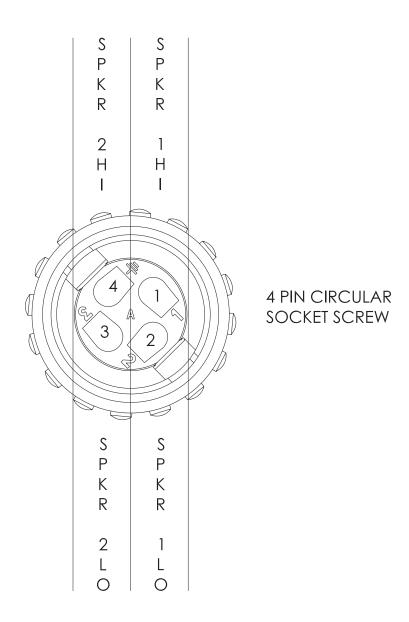


	NAME	DATE	UNLESS OTHERWISE SPECIFIED:			NODYNE		KFLOW	NA BC CANADA
DRAWN	DMF	12-Nov-14	DIMENSIONS ARE IN INCHES [MM] TOLERANCES:	│ <i>∦</i> ▲ ₹	N V I EI	ECTRONICS ANUFACTURING CORP.			(250)-763-1088 AEM-CORP.COM
CHECKED	11/1/18	16-Feb-14	FRACTIONAL±0.0625" ANGULAR ±0.5°	TITLE		ANOTACIONNA COM:			
APPROVED	13/1/8	Apr 28/15	TWO DECIMAL PLACE ±0.010" THREE DECIMAL PLACE ±0.005"	IIILE:	LOUD SPEAKER				
CONFIDENTIAL AND PROPRIETARY THE INFORMATION CONTAINED IN THIS		MATERIAL:			CONNECT	OR MAP			
	ING IS THE SOLE PE ELECTRONICS MA		FINISH:	PAPER SIZE:	CAGE CODE	PART No.:			REVISION
WITHOU	DUCTION IN PART JT THE WRITTEN PER	rmission of	NA	A	L9015		LS300		2.00
ANODYNE E	ANODYNE ELECTRONICS MANUFACTURING IS PROHIBITED.		SCALE:NT	SCALE:NTS   DO NOT SCALE DRAWING   DRAWING No.: 405-0				SHEET:1 of 1	

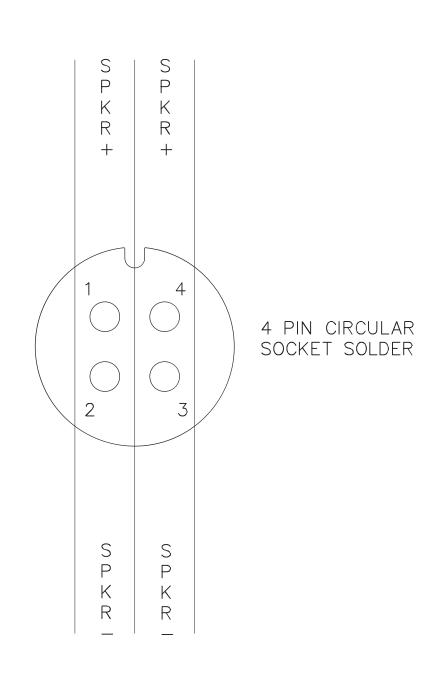


	NAME	DATE	UNLESS OTHERWISE SPECIFIED:		A A	NODYNE		KELOW	/NA BC CANADA
DRAWN	DMF	12-Nov-14	DIMENSIONS ARE IN INCHES [MM] TOLERANCES:	▎∥≜▮		ECTRONICS Anufacturing	: CORP	www.	(250)-763-1088 AEM-CORP.COM
CHECKED	11/1/69	12-Nov-14	FRACTIONAL ±0.0625" ANGULAR ±0.5°	TITLE.	manoracionna com.				
APPROVED	13/18	Nov 14/14	TWO DECIMAL PLACE ±0.010" THREE DECIMAL PLACE ±0.005"	LOUD SPEAKER					
	DENTIAL AND PROPERTY OF THE PR	CINLIANI	material: NA	CONNECTOR MAP					
	ING IS THE SOLE PE ELECTRONICS MA			PAPER SIZE:	CAGE CODE	PART No.:			REVISION
ANY REPRO WITHOL	DUCTION IN PART JT THE WRITTEN PER	OR AS A WHOLE RMISSION OF	FINISH: NA	A	L9015 LS300			1.00	
ANODYNE ELECTRONICS MANUFACTURING IS PROHIBITED.		NUFACTURING IS		SCALE:NT	S DO NOT SO	CALE DRAWING	DRAWING No.: 405-0		SHEET:1 of 1

	REVISIONS		
REV	DESCRIPTION	DATE	BY
2.00	ECO# 1037, NEW CONNECTOR	16-Feb-15	DMF



	NAME	DATE	UNLESS OTHERWISE SPECIFIED:		A A	NODYNE		KELOWNA !	BC CANADA
DRAWN	DMF	12-Nov-14	DIMENSIONS ARE IN INCHES [MM] TOLERANCES:	│ <b>/</b> ▲ ■		ECTRONICS ANUFACTURING	CORP		50)-763-1088 -CORP.COM
CHECKED	11/1/18	16-Feb-14	FRACTIONAL±0.0625" ANGULAR±0.5°	TITLE		Anoracionina	oom .		
APPROVED	13/1/8	Apr 9/15	TWO DECIMAL PLACE ±0.010" THREE DECIMAL PLACE ±0.005"	TITLE:			D SPEAKER		
CONFIDENTIAL AND PROPRIETARY THE INFORMATION CONTAINED IN THIS		MATERIAL:			CONN	IECTOR MAP			
	ING IS THE SOLE PE ELECTRONICS MA			PAPER SIZE:	CAGE CODE	PART No.:			REVISION
ANY REPRO	DUCTION IN PART JT THE WRITTEN PER	OR AS A WHOLE	FINISH: NA	A	L9015		LS600		2.00
ANODYNE	ELECTRONICS MAI	NUFACTURING IS		SCALE:NT	S DO NOT SO	CALE DRAWING	DRAWING No.: 405-0	SHE	ET:1 of 1

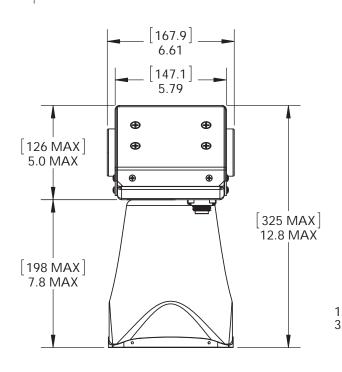


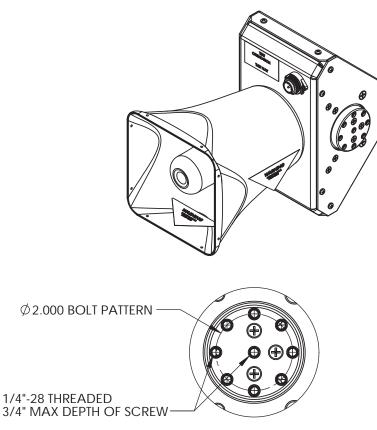
	NAME	DATE	UNLESS OTHERWISE SPECIFIED:		Al	NODYNE		KELO	WNA BC CANADA
DRAWN	DMF	13-Nov-14	DIMENSIONS ARE IN INCHES [MM] TOLERANCES:	│ <b>/</b> △ ⊒		ECTRONICS ANUFACTURING	CORP	WWW	(250)-763-1088 V.AEM-CORP.COM
CHECKED	11/1/18	13-Nov-14	FRACTIONAL ±0.0625" ANGULAR ±0.5°	TITLE:		ANOTAG TORING	JOOKI .		
APPROVED	12/18	16-Dec-14	TWO DECIMAL PLACE ±0.010" THREE DECIMAL PLACE ±0.005"	I IIILE:			id speaker		
CONFIDENTIAL AND PROPRIETARY THE INFORMATION CONTAINED IN THIS		OFKILIAKI	MATERIAL:			CON	NECTOR MAP		
	ING IS THE SOLE PE		NA	DADED CIZE.	CACE CODE	DADT No.			REVISION
ANY REPRO WITHOL	ELECTRONICS MADUCTION IN PART JT THE WRITTEN PER	OR AS A WHOLE RMISSION OF	FINISH: NA	A PAPER SIZE:	L9015	PART No.:	LS600		1.00
ANODYNE	ELECTRONICS MAI PROHIBITED.	NUFACTURING IS		SCALE:NT:	S DO NOT SO	CALE DRAWING	DRAWING No.: 405-0		SHEET:1 of 1

	REVISIONS		
REV.	DESCRIPTION	DATE	NAME
2.00	ECO# 1037, NEW DESIGN AFTER VIBRATION TESTING	02-Mar-15	DMF

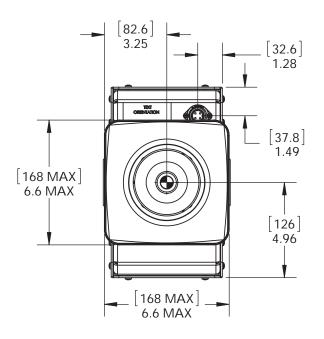
#### NOTES:

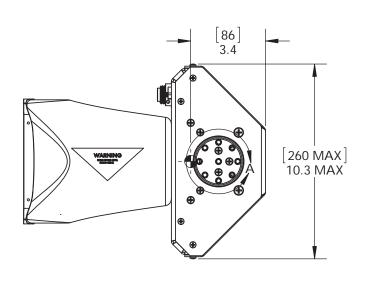
- 1. MASS 15 lbs [6.8 kg] MAX.
- 2. DENOTES CENTER OF GRAVITY (est.)





DETAIL A MOUNTING HOLE PATTERN SCALE 2 : 5



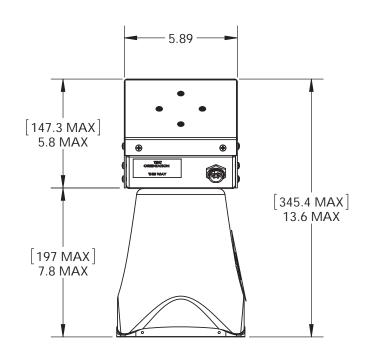


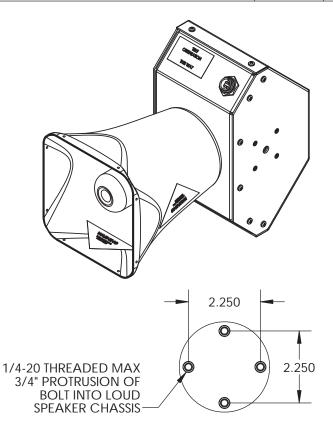
	NAME	DATE	UNLESS OTHERWISE SPECIFIED:		ANOL	TYNF			KIRSCHNER RD.
DRAWN	DMF	14-Nov-14	DIMENSIONS ARE IN INCHES [MM] TOLERANCES: ANGULAR ±0.5°	/ <u>^</u> =	ELEC	TRONICS UFACTURINA CORI	e.		WNA BC V1Y 4N7 (250)-763-1088
CHECKED	11 1Kg	11-Mar-15	FRACTIONAL ±0.0625" ONE DECIMAL PLACE ±0.100"	TITLE:			~	www.	AEM-CORP.COM
APPROVED	13/18	Apr 28/15		IIILL.		LOI	JD SPEAKER		
CONFIDENTIAL AND PROPRIETARY THE INFORMATION CONTAINED IN THIS DRAWING		OI KILIAKI	MATERIAL: N/A		M	IECHANI	CAL INSTALLATION		
IS THE SOLE PROPERTY OF ANODYNE ELECTRONICS MANUFACTURING, ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ANODYNE		NODYNE		PAPER SIZE:	CAGE CODE	PART No. :			REVISION
		AS A WHOLE	FINISH: N/A	Α	L9015		LS300-200		2.00
ELECTRONICS	ELECTRONICS MANUFACTURING IS PROHIBITED.			SCALE: 1:	DO NOT S	CALE DRAWING	DRAWING No. : 922-0	SHEET	T: 1 OF 1

	REVISIONS		
REV.	DESCRIPTION	DATE	NAME
1.10	RAS# 379, ADDED 3/8-16 THREADED NOTE, UPDATED DIMENSION SIZES	17-Nov-14	DMF

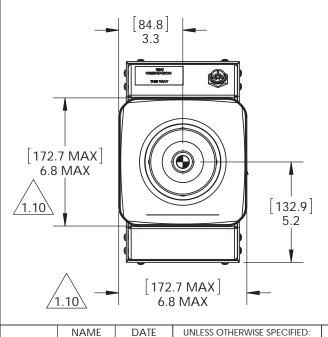
#### NOTES:

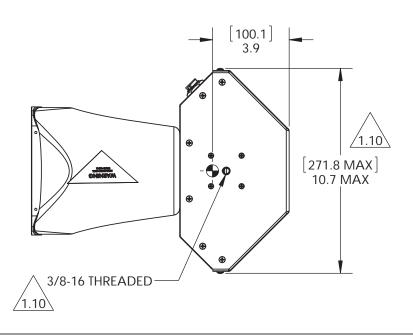
- 1. MASS 15 lbs [6 kg] MAX.
- DENOTES CENTER OF GRAVITY (est.)





**SCALE 1:3** DIAMOND MOUNTING PATTERN





	NAME	DATE
DRAWN	DMF	14-Nov-14
CHECKED	P P	14-Nov-14
APPROVED	13/1/8	Nov 17/14

	INAIVIE   DATE		UNLESS OTHERWISE SPECIFIED.				
DRAWN	DMF	14-Nov-14					
CHECKED 14-Nov-			ANGULAR±0.5 ° FRACTIONAL±0.0625" ONE DECIMAL PLACE ±0.100"				
APPROVED	13/1/8	Nov 17/14	TWO DECIMAL PLACE ±0.030" THREE DECIMAL PLACE ±0.010"				
CONFIDEN	NTIAL AND PRO	OPRIETARY	MATERIAL:				
	ION CONTAINED IN		N/A				
	DLE PROPERTY OF A NICS MANUFACTUR		FINISH:				
	NICS MANUFACTUR						
	VRITTEN PERMISSION		N/A				
	MANUFACTURING		_				
LLLCINOIVIOS	MANOLACIONING	ISTROTIBITED.	_				

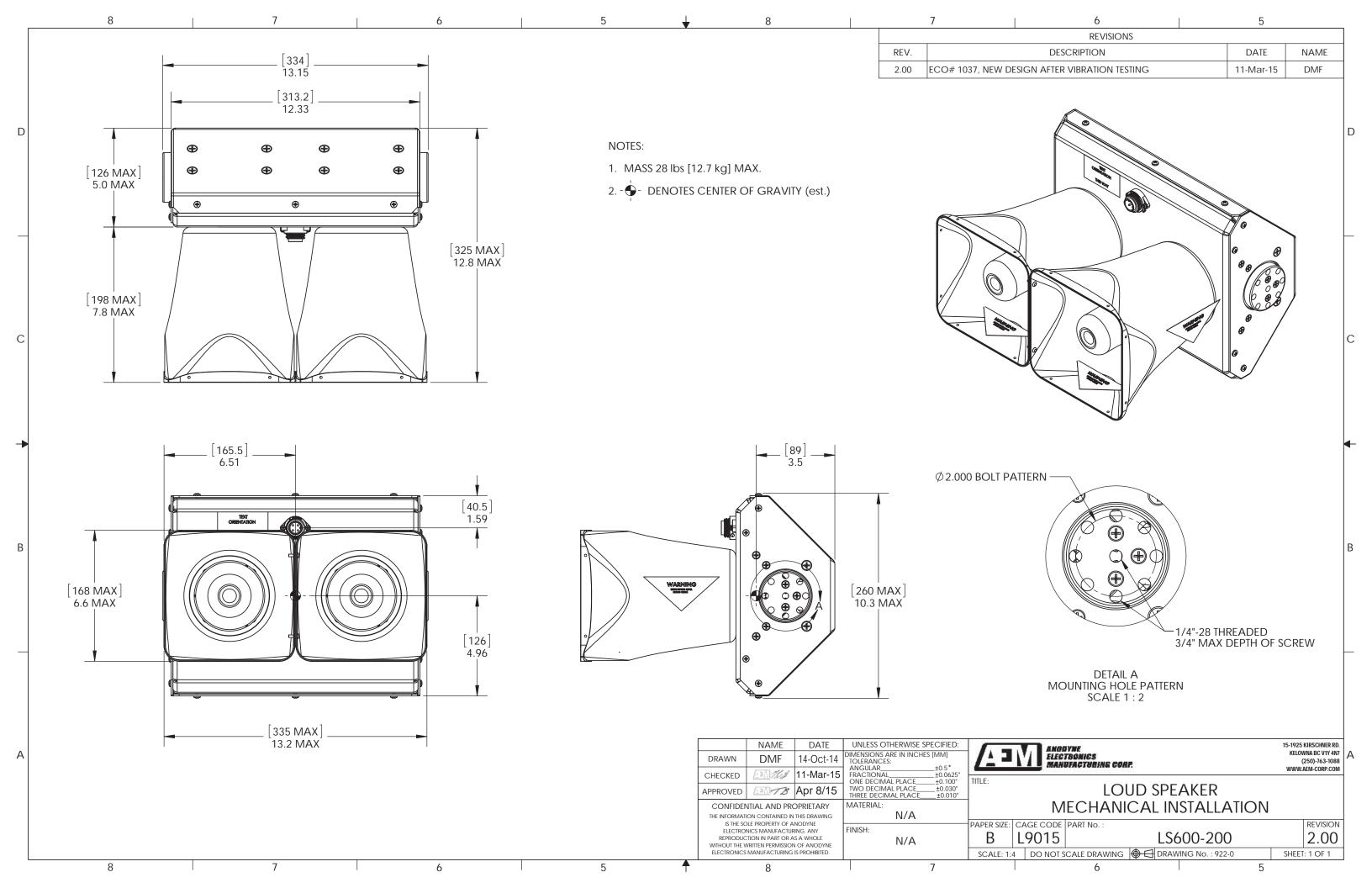


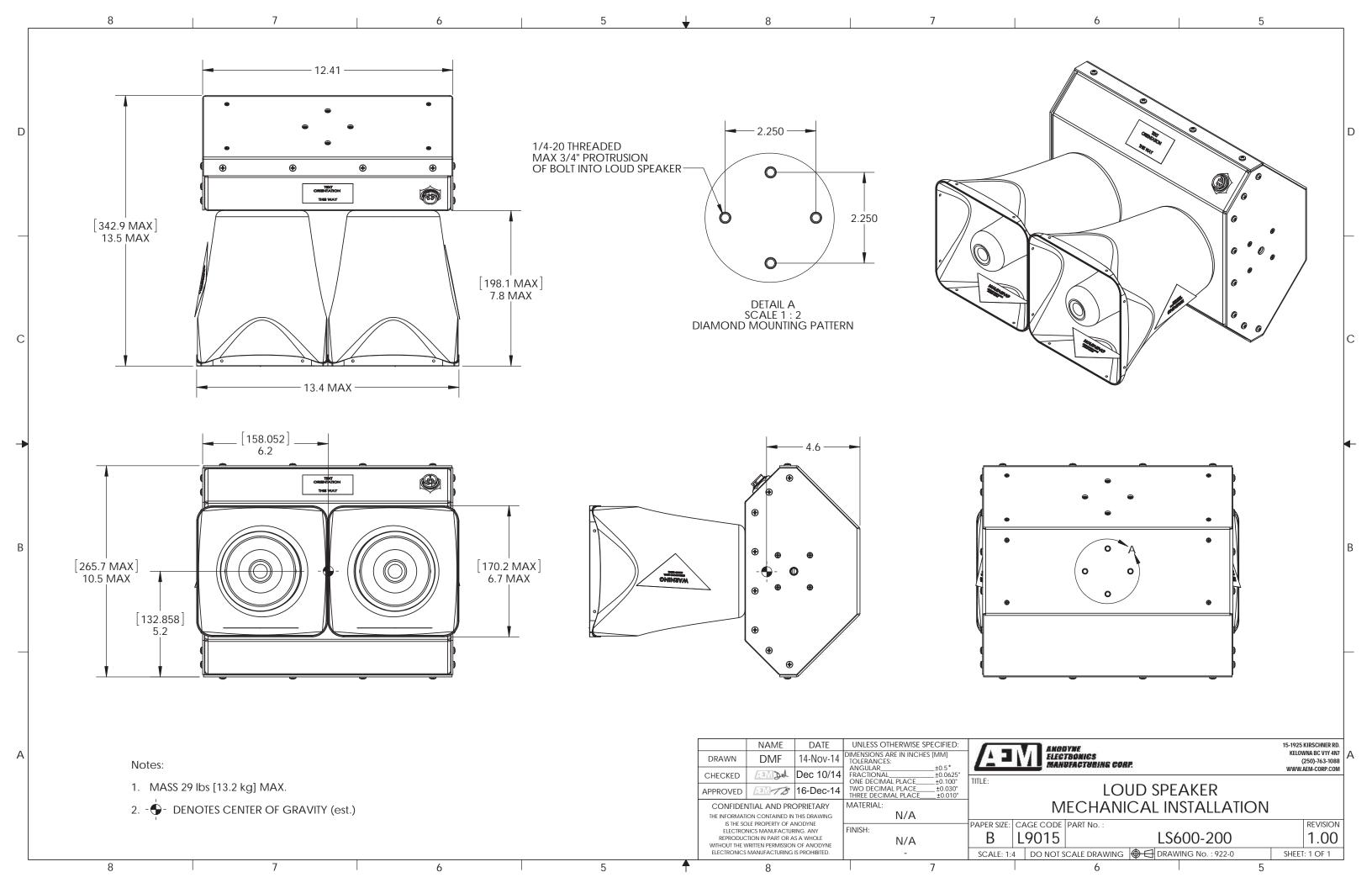
ANODYNE ELECTRONICS MANUFACTURINA CORP.

15-1925 KIRSCHNER RD. KELOWNA BC V1Y 4N7 (250)-763-1088 WWW.AEM-CORP.COM

**LOUD SPEAKER** MECHANICAL INSTALLATION

PAPER SIZE:	CAGE CODE	PART No. :			REVISION	
Α	L9015		LS300-200		1.10	
SCALE: 1:5 DO NOT S		SCALE DRAWING	DRAWING No. : 922-0	SHEET	: 1 OF 1	







## **Section 3.0 Operation**

### 3.1 Operation Specifics

The LSxxx Series High Power Loud Speaker has no normal user operational aspects.

End of Section 3.0